

REMARKS

Favorable reconsideration of this Application and the Office Action of February 25, 2005 are respectfully requested in view of the foregoing amendments and the following remarks.

Claims 1 to 26 remain in this application. Claims 1 to 12 remain under consideration in this application. Claims 13 to 26 stand withdrawn from consideration under 37 CFR 1.142(b) as being directed to the non-elected invention. Applicant confirms the oral election of the invention set forth by the subject matter of claims 1 to 12. However, Applicant submits that non-elected use claims 13 to 26 should be rejoined with composition claims 1 to 12 upon allowance of the composition claims in accordance with the statements of the Federal Circuit court the case of *In re Ochiai*, 71 F. 3d 1565, 37 USPQ2d 1127 (Fed. Cir. 1995).

The specification has been corrected to correctly indicate that priority of the provisional application no. 60/493,089, filed August 6, 2003, is claimed under 35 U.S.C. 119(e), and to eliminate the erroneous indication that the present application is a continuation of that provisional application.

The rejection of claims 1-12 under 35 U.S.C. 103(a) as unpatentable over Honda et al (US 2001/0034313), Hara et al (US 2002/0128164) or Lee (US 2004/0067860) is respectfully traversed. It is respectfully submitted that the disclosures in these cited documents do not render the claimed subject matter of claims 1 to 12 obvious to one skilled in the art, and the rejection is therefore erroneous and should be withdrawn.

It is submitted that a proper and complete understanding of the context of the present invention clearly shows the unobvious and patentable nature of the cleaning compositions of this invention. As microelectronic device fabrication has advanced certain new problems have developed. Due to issues with electrical performance and reliability in

mass production, a variety of metal stacks are utilized for forming gate lines in FPD technology. Multiple metal layers such as Mo/AlNd/Mo, and especially double layers such as Mo/AlNd, AlNd/Ti, and AlNd/Cr are common for gate line metal stacks in current manufacturing of FPD technologies. However, in stacks where the AlNd alloy is located beneath another metal, aluminum corrosion during the rinse step can be a critical problem for electrical performance. This corrosion is commonly known as overhang and can create voids that weaken the metal structure. Loss of aluminum to corrosion during the chemical cleaning or water rinse steps can also create notching in the metal lines, which is a most common defect at FPD technology. The composition of the cleaning solution and its behavior in water plays a key role in causing corrosion. A typical photoresist remover for FPD applications might include polar organic solvents blended with organic amines and other solvating agents. Amines have been shown to increase the effectiveness of photoresist removal in solvent blends. However, the water rinse following use of this type of cleaner or remover can create a strongly alkaline aqueous solution and that can lead to considerable loss of metal from the patterned lines. This necessitates an intermediate rinse between the cleaning/stripping step and the aqueous rinse. Such an intermediate rinse, typically with isopropyl alcohol, adds undesirable time, safety concerns, environmental consequences, and cost to the manufacturing process. Thus, there was a need for an alkaline-containing stripping and cleaning compositions for photoresists that enable one to completely remove both photoresist and etch and/or ash residue from the microelectronic substrate yet not produce any significant metal corrosion during a subsequent aqueous rinse step, especially for FPD microelectronic elements.

The present invention addressed this problem and need for a cleaner/stripper/remover that would not produce such undesirable corrosion in a subsequent aqueous rinse and not require any intermediate rinse. The problem is addressed by the non-aqueous cleaning compositions of the present invention.

The disclosure in Honda et al., while generally relating to cleaners that avoid metal corrosion, does not appreciate or address the problem of the corrosion addressed by

Applicants in regard to FPD microelectronic devices. Thus, **Honda et al employ water** in their compositions, and water is stated to be a **critical** ingredient and is preferably employed in an amount of 5-35% water, and more preferably 10-30% water (see paragraphs 0002, 0037 and 0039 of the Honda et al disclosure). Moreover, Honda et al disclose that the compositions of their invention, absent water, do not remove plasma-etch residues (see paragraphs 0054-0055 of Honda et al.). In contrast to the compositions of Honda et al., the compositions of Applicant's present invention are **non-aqueous**, in addition to being different in other ways.. Thus, to one skilled in the relevant art, the Honda et al disclosure teaches away from the non-aqueous compositions of Applicant's invention rather than rendering them obvious. Additionally, Honda et al do not appreciate that the compositions **must** contain both a compound selected from the group consisting of an aliphatic alcohol, diol, polyol or glycol ether, and then an additional organic co-solvent, as is required in the composition of the present invention. In fact, Honda et al. disclose no specific cleaning compositions with both those components. There is no disclosure of compositions in Honda et al. that have an aliphatic alcohol, diol, polyol or glycol ether in their compositions. For these reasons the aqueous compositions disclosed in Honda et al. do not and cannot disclose the non-aqueous aliphatic alcohol, diol, polyol or glycol ether and other organic solvent-containing compositions of the present application.

Furthermore, the present invention requires a weak acid component (b), that weak acid having a strength expressed as a "pKa " for the dissociation constant in aqueous solution of from about 1.2 to about 8, and that weak acid component (b) must be present in the composition in an amount such that the equivalent mole ratio of acid/amine is greater than .75. Honda et al. do not teach that acids must have these limitations as specified in Applicant's claims. Moreover, the amount of acid (lactic acid corrosion inhibitor) employed in the Honda et al. examples are only 0.06, not greater than 0.75, and Honda et al has no appreciation of the need for the higher ratio of acid to amine as required by Applicant's invention. Therefore, Honda et al cannot disclose or render obvious the non-aqueous compositions of this invention containing a weak acid component having a strength expressed as a "pKa " for the dissociation constant in aqueous solution of from about 1.2

to about 8, and that weak acid component being present in the composition in an amount such that the equivalent mole ratio of acid/amine is greater than .75.

For at least these reasons the rejection of claims 1-12 over Honda et al. is erroneous and its withdrawal is respectfully requested.

The compositions disclosed in the Hara et al document are entirely different than the compositions of the present invention. The compositions of Hara et al. must contain a peroxide oxidizing agent and a quaternary ammonium salt, neither of which is employed in Applicant's compositions. Furthermore, Hara et al. fail to disclose that the cleaning compositions **must** contain a nucleophilic amine, a moderate to weak acid having a strength expressed as a "pKa " for the dissociation constant in aqueous solution of from about 1.2 to about 8, a compound selected from the group consisting of an aliphatic alcohol, diol, polyol or glycol ether, and an organic co-solvent, and the weak acid component (b) must be present in the composition in an amount such that the equivalent mole ratio of acid/amine is greater than .75. No such composition is disclosed, taught or suggested by the disclosure in Hara et al. Thus, the disclosure in Hara et al. cannot render obvious, to one skilled in the art, the compositions of claims 1 to 12 and withdrawal of this rejection of claims 1-12 is respectfully requested..

Like Honda et al., the compositions of Lee et al. are aqueous compositions that must contain water (paragraph 0031). Additionally, chelating agent (which may be acids) are **optional** in the Lee et al. compositions. Likewise, as with the Honda et al. and Hara et al documents the disclosure in Lee et al. does not teach or appreciate the need to have in a cleaning compositions a moderate to weak acid having a strength expressed as a "pKa " for the dissociation constant in aqueous solution of from about 1.2 to about 8 in an amount such that the equivalent mole ratio of acid/amine is greater than .75, and that the composition must also contain both a compound selected from the group consisting of an aliphatic alcohol, diol, polyol or glycol ether, in addition to an organic co-solvent. Thus, the disclosure in Lee et al. requiring an aqueous compositions and not recognizing the

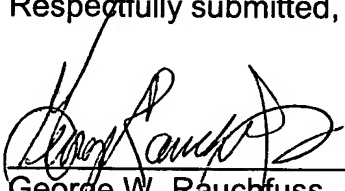
requirements for the other components and in the amount specified for the acid/amine ratio leads one away from the claimed invention. Thus, Lee et al cannot render the claimed invention obvious to one skilled in the art and withdrawal of the rejection of claims 1-12 over Lee et al. is respectfully requested..

For at least the above reasons, applicants respectfully request that the rejection of claims 1 to 12 under 35 U.S.C. 103 in view of Honda et al., Hara et al. or Lee et al. be reconsidered and withdrawn. After withdrawal of this rejection Applicant request rejoinder of claims 13 to 26 with claims 1 to 12, per *In re Ochiai*, 71 F. 3d 1565, 37 USPQ2d 1127 (Fed. Cir. 1995).

It is respectfully submitted that the foregoing is a full and complete response to the Office Action and that all the claims are allowable for at least the reasons indicated. An early indication of their allowability by issuance of a Notice of Allowance is earnestly solicited.

Respectfully submitted,

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